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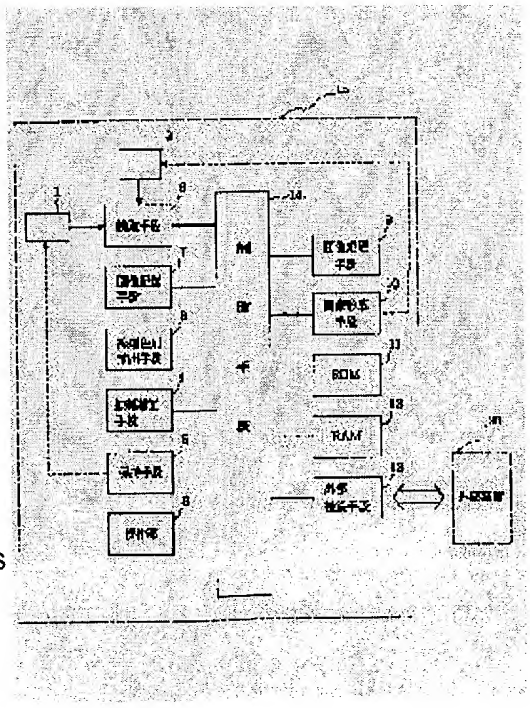
(54) COLOR IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To form a clear image by calculating by-color correction data by means of information extracted by coolor by a line width color classification extraction means and providing a line width correction means, etc., giving correction at the time of forming a general image based on this so as to eliminate the splash of toner at the edge part of a line image, etc.

SOLUTION: An original image for a test 1 is read by the reading means 6 of a color image forming device 15 and stored in an image storage means 7. At the same time the image 1 is processed by an image processing means 9 and after then image is formed by an image forming means 10 to prepare an image form for correction processing 2. The image form for correction processing 2 is read buy the reading means 6 and stored by the image storage means 7. The line width color classification extraction means 3 compares the line width of the original image for a test 1 with that of the image form for correction processing 2 and extracts the parts different in line



width from each other by color to store them in a RAM 12. A line width correction means 4 calculates correction data by color based on difference information of the line width, etc., and transmits it to the image processing means 9 to execute processing through the use of color classification correction data calculated based on this.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] About image formation equipments, such as an electrophotography copying machine, a laser beam printer with a scanner, and facsimile, further, this invention loses toner scattering in the edge part of an image in a detail, and relates to the image formation equipment which makes clear image formation possible.
[0002]
[Description of the Prior Art] In color picture formation equipment, although it was common to have piled up the toner image of two or more colors, and to have formed the image of a desired color, from the adhesion degree of a toner image falling, so that superposition becomes the latter part, the toner dispersed especially in the line drawing image part, and there was an inclination used as indistinct image formation. As an approach of forming the clear color picture which cancels such nonconformity conventionally and does not have toner scattering near the edge of a line drawing image The approach of the total volume control which decreases the amount of toners of a line drawing image part uniformly to each color, In view of a toner image stopping being able to adhere to the edge part of a line drawing image easily, so that superposition becomes the latter part, by making [more] the amount of the latter black toner used than the amount of other color toners used The method of decreasing hue change and toner scattering of an image edge was proposed (refer to JP,5-207276,A).
[0003]
[Problem(s) to be Solved by the Invention] However, although the amount of toner scattering of an image edge decreases by the conventional approach mentioned above Become the image which it was thickly formed a little from the line breadth of a subject copy, or black cut from the hue of the image edge of a subject copy, or further It was difficult to constitute the color picture formation equipment which can form the image of the high quality which dispersion arises in extent of effectiveness between equipment since the amount of amendments is the same, and has the fault of changing extent of effectiveness according to secular change even if it is the same equipment, and always does not have toner scattering. This invention is made in order to cancel the fault of the conventional color picture formation equipment mentioned above, and it does not have dispersion for every equipment, moreover there is also no fluctuation of the effectiveness by secular change, scattering of the toner in edge parts, such as a line drawing image, is lost, and it aims at offering the color picture formation

equipment which can form a clear image.
[0004]
[Means for Solving the Problem] In order to attain the above-mentioned object, invention according to claim 1 In the color picture formation equipment which has an amendment function for forming an image without toner scattering in the edge part of a line drawing image The image form for amendment processing by which image formation was carried out, and the image form for the above-mentioned amendment processing are read in the manuscript image for a test. An extract means classified by line breadth color to extract the line breadth of the manuscript image for the above-mentioned test, and the line drawing image formed in the image form for the above-mentioned amendment processing, and the toner scattering condition of the near according to a color, It is characterized [main] by having a means to compute the amendment data classified by color automatically, and a line breadth amendment means to amend based on the calculation result at the time of formation of the image for general, based on the information extracted according to the color of the above-mentioned extract means classified by line breadth color. In invention of claim 2, it is characterized [main] by being color picture formation equipment equipped with a maintenance means to hold the manuscript image for the above-mentioned test in equipment in color picture formation equipment according to claim 1. In invention of claim 3, the manuscript image for the above-mentioned test is characterized [main] by being the test form printed beforehand or the storage memorized as a predetermined code in color picture formation equipment according to claim 2. In invention of claim 4, the above-mentioned line breadth amendment means is characterized by being color picture formation equipment with the amendment function which decreases the amount of toners of the part concerned so that the amount of toner scattering may decrease in the edge part of the whole line drawing image or a line drawing image in claim 1, claim 2, or color picture formation equipment according to claim 3.
[0005] By invention of claim 5 In color picture formation equipment according to claim 4, the above-mentioned line breadth amendment means is equipped with two or more amendment patterns which decrease in number the amount of toners in the edge parts of the whole line drawing image and a line drawing image, and is characterized [main] by being color picture formation equipment constituted so that any one might be chosen at the time of image formation. In invention of claim 6, selection of the pattern in the above-mentioned line breadth amendment means is characterized by being color picture formation equipment determined corresponding to the description of the read manuscript image in color picture formation equipment according to claim 5. Moreover, invention according to claim 7 is set to the color picture formation equipment which has an amendment function for forming an image without toner scattering. An amendment exclusion means to except the toner of a specific color from the object of amendment beforehand, and a boundary detection means to detect the boundary of a background pixel and a non-background pixel, The non-background pixel which should be counted and amended from the non-background pixel which touches the above-mentioned boundary is characterized [main] by having an object pixel detection means to detect in what position it is located, and an amendment means to amend a non-background pixel according to the detection result by this object pixel detection means.
[0006] In invention of claim 8, in color picture formation equipment according to claim 7, the amendment result of a non-background pixel and a background pixel are

measured, and it is characterized [main] by having the pixel data permutation means which transposes the data of a non-background pixel to the data of a background pixel according to the comparison result. In invention according to claim 9, in color picture formation equipment according to claim 8 or 7, it has a line breadth detection means to detect the width of face of the line drawing image expressed with a non-background pixel, and is characterized [main] by the width of face of a line drawing image amending to the non-background pixel of the part below a predetermined value. Invention according to claim 10 is characterized by color picture formation equipment according to claim 7 to 9 being what uses a monochromatic toner for every pixel and performs a multicolor expression with the combination of the color of two or more pixels. Invention of claim 11 is characterized by color picture formation equipment according to claim 7 to 9 being what the toner of two or more colors makes pile each other up, and performs a multicolor expression for every pixel.

[0007]

[Function] The color picture formation equipment constituted like claim 1 Form the image form for amendment processing from the manuscript image for a test, and the image form for the amendment processing is read. The extract means classified by line breadth color extracts the difference in the line breadth of the manuscript image for the above-mentioned test, and the line drawing image formed in the image form for the above-mentioned amendment processing according to a color. Since the amendment data classified by color can be automatically computed with a line breadth amendment means based on the extracted information, and it can amend based on the calculation result so that the difference in line breadth may not arise at the time of image formation Amendment according to color suitable for each equipment is performed, and the color picture formation equipment which prevented turbulence by toner scattering in the edge part of an image and generating of a hue difference can be constituted. With the color picture formation equipment of claim 2, since it had a maintenance means to hold the manuscript image for the test of the 1st above-mentioned term in equipment, the time and effort which reads the manuscript image for a test can be saved, and line breadth can be amended promptly [always].

[0008] With the color-picture formation equipment of claim 3, in color-picture formation equipment given [above-mentioned] in dyadic, since it considered as the test form beforehand printed as a manuscript image for the above-mentioned test, easily, the formed image form for amendment processing and the transfer paper by which image formation was carried out with the equipment amended the color exception can be seen by the eye, and can check the amendment effectiveness. Moreover, if it is the storage memorized in code like ROM with built-in equipment, for example, the time and effort specially set to a manuscript base like a test form can be saved, and it is semipermanently usable, and moreover it will soil, or will lose and will not become activity impossible. With the color picture formation equipment of claim 4, the 1st above-mentioned term, the 2nd above-mentioned term, In color picture formation equipment given [above-mentioned] in 3 terms, it is based on the information extracted according to the color of the extract means classified by line breadth color. Or the line drawing image whole, Or since it had a line breadth amendment means to control the amount of toners of the edge part of a line drawing image, turbulence by toner scattering generated at the edge edge of an image can be abolished, and it can double with the line breadth and the hue of a subject copy.

[0009] With the color picture formation equipment of claim 5, since some line breadth amendment means of the 4th above-mentioned term chose one at the time of two or

more preparations and image formation, they can carry out image formation of the pattern which lessens the amount of toners of the edge parts of the whole line drawing image or a line drawing image using the pattern suitable for the description of a manuscript image. With the color picture formation equipment of claim 6, since it opts for selection of the pattern of the line breadth amendment means of the 5th above-mentioned term according to the gestalt of a manuscript image, an image with many alphabetic characters, an image with many pictures, an image with much photograph drawing, etc. can choose and carry out image formation of the pattern suitable for each description.

[0010] According to invention according to claim 7, by excepting from the object of amendment beforehand, the toner of a specific color can shorten the processing time and can prevent toner scattering very effectively by changing the degree of amendment according to physical relationship with a background image about the non-background pixel which should be amended. Moreover, reading processing of the image form for amendment processing so that in above-mentioned claim 1 by this claim 7 publication, Since it is not necessary to perform processing which extracts the manuscript image for a test, the line drawing image formed in the image form for amendment processing, and the toner scattering condition of the near according to a color, processing which computes the amendment data classified by color based on the information extracted according to the color Moreover, amendment processing can be carried out rather than the color picture formation equipment of claim 1 to a test in a short time, not using a form vainly. In invention of claim 8, in color picture formation equipment according to claim 7, the amendment result of a non-background pixel and a background pixel are measured, and by transposing the data of a non-background pixel to the data of a background pixel according to the comparison result, since it amended, generating of nonconformity, like a non-background pixel becomes thinner than a background pixel can be prevented beforehand.

[0011] In invention according to claim 9, in color picture formation equipment according to claim 8 or 7, since the width of face of the line drawing image expressed with a non-background pixel is detected, and the width of face of a line drawing image was made not to amend to the non-background pixel of the part below a predetermined value, and it amended, generating of the nonconformity of a thin line breaking off or disappearing can be prevented beforehand. That is, although amendment is too strong and may spoil the image of a thin line when it amends by the same degree (correction factor) as the part of **** since the part of a thin line does not have the degree of generating of toner scattering the same as the part of **** at all, the image of high quality is obtained because width of face excepts from the object of amendment of the thin line part below a predetermined value as mentioned above. In invention according to claim 10, by being what uses a monochromatic toner for every pixel and performs a multicolor expression with the combination of the color of two or more pixels, it can amend independently for every toner of each colors (C, M, Y, K, etc.) for toner scattering prevention, and color picture formation equipment according to claim 7 to 9 is simplified, and can carry out [low cost]-izing of the equipment configuration. Invention of claim 11 can be amended at once to the toner of each colors (C, M, Y, K, etc.), when color picture formation equipment according to claim 7 to 9 is what the toner of two or more colors makes pile each other up, and performs a multicolor expression for every pixel.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is

explained to a detail with reference to a drawing.
[the gestalt of the 1st operation] -- a color electrophotography copying machine (it is hereafter described as a color copying machine) is illustrated and explained as an example of application of the color picture formation equipment applied to this invention here. In addition, since the detailed function of the color copying machine itself and the configuration are well-known, they already omit explanation, and they explain it focusing on the part about this invention. Drawing 1 is the block block diagram showing an example of the gestalt of operation of the color picture formation equipment of this invention. The image form for amendment processing which a sign 1 is a manuscript image for a test in this drawing, and forms 2 based on the manuscript image for the above-mentioned test, An extract means classified by line breadth color for 3 to compare the image for a test with the image for amendment processing, and to detect the toner scattering situation in a line drawing image and its near based on both, A line breadth amendment means by which 4 amends so that toner scattering of a line drawing image part may decrease, A maintenance means for 5 to carry out storage preservation of the above-mentioned subject-copy image for a test and 6 Image readers, such as a scanner, In 7, an image storage means and 8 the image-processing section and 10 for a control unit and 9 Image formation equipment, The whole color picture formation equipment with which ROM and 12 were equipped with RAM and, as for 13, 11 was equipped with an external connecting means and each part of a more than [14 / 15 / a control means and], and 20 are external devices, such as a personal computer connected through the above-mentioned external connecting means 13. In the above configuration, the example of fundamental actuation of the gestalt of this operation and procedure is explained.
[0013] First, while reading the subject-copy image 1 for a test with the reading means 6 of a color copying machine 15 and memorizing for the image storage means 7, image formation is carried out with the image formation means 10 after processing with the image-processing means 9, and the image form 2 for amendment processing is created. The image form 2 for amendment processing is set to the reading base of the color copying machine which is not illustrated, is read with the reading means 6, and is memorized by the image storage means 7. the part from which the above-mentioned extract means 3 classified by line breadth color compares the read line breadth of the manuscript image 1 for a test, and the line drawing image of the image form 2 for amendment processing with, and both line breadth is different -- a color exception -- extracting -- the image storage means 7 -- or it memorizes to RAM12. The line breadth amendment means 4 computes the amendment data classified by color so that the image to wish to have may be obtained based on the difference information on the image the line breadth and near the line drawing image, and it tells the image-processing means 9. With the image-processing means 9, image formation processing of the manuscript image which should be copied is performed using the amendment data classified by color computed based on this information. In addition, although image formation can be further carried out to a transfer paper after amendment processing and the amended situation can be checked, when the need does not exist, it can also omit. When a specific notation and a specific pattern are set up, the notation of these specification etc. is recognized automatically and it has been recognized as it being a subject-copy image for a test, image formation of the discernment of whether the read image is the manuscript image 1 for a test or to be a common image is carried out as an image form 2 for amendment processing. Moreover, when the special key of a control unit 8 is pushed, it is also possible to perform processing which considers

that it is reading of the manuscript image 1 for a test, and creates the image form 2 for amendment processing.

[0014] The above-mentioned maintenance means 5 may divert some storages used for other object that what is necessary is to be a storage means for saving the manuscript image 1 for a test, for example, not to keep a form as a manuscript image 1 for a test, and just to carry ROM and RAM in the necessary location on a printed circuit board if storages, such as ROM and RAM, are used. In addition, what is necessary is it to be also possible for to print and keep the subject-copy image for a test in a form, and just to prepare the form which printed the special test pattern in this invention. The control means 14 is bearing the function which supervises whether it generally has Micro CPU, and recognition of the key on which the control unit 8 was pushed, and the signal of each means mentioned above are transmitted, aiming at a synchronization, or each means is operating normally. ROM11 is used also for carrying out storage storage of the manuscript image 1 for a test, as the program of the micro CPU of a control means 14 is stored and being mentioned above. RAM12 is used for memorizing the count result of Micro CPU temporarily. The external connecting means 13 is used for connection with the external devices 20, such as a personal computer, and makes it possible reception and to carry out image formation for the image data from an external device.

[0015] Drawing 2 thru/or drawing 7 are drawings for explaining detailed actuation of the gestalt of this operation. Drawing 2 (a) is what showed an example of the manuscript image 1 for a test, for example, the color picture of a plus pattern is drawn. This drawing (b) is what expanded the plus pattern, and the appearance of the plus pattern of line breadth t is shown. Drawing 3 (a) is the image form 2 for amendment processing which read the manuscript image 1 for the test of above-mentioned drawing 2 with the color picture formation equipment 15 which it is going to amend, and carried out image creation. Under the present circumstances, the read manuscript image data for a test is memorized in memory. Usually, drawing by which image formation was carried out serves as an image which dispersed in both sides and protruded only width-of-face deltat from the line breadth t of a plus pattern as shown in this drawing (b). While reading again the image formed in the image form 2 for amendment processing of drawing 3 with color picture formation equipment 15 and memorizing it temporarily It compares with the manuscript image data for a test memorized previously. With the extract means 3 classified by line breadth color the information C (cyanogen), M (Magenta), Y (yellow), and K (black) according to each color in line breadth t -- each -- it breaks up, the information delta C, delta M, delta Y, and delta K according to color of width-of-face deltat is extracted, and it memorizes for the image storage means 7.

[0016] The manuscript image 1 for a test is compared with the plus pattern of the image form 2 for amendment processing for breaking up with line breadth t and identifying width-of-face deltat to accuracy, and if accuracy is asked for deltat from the plus pattern of the image form 2 for amendment processing, it can also omit also memorizing the manuscript image for a test, and comparing both. Drawing 3 (b) breaks up and indicates intelligibly the information delta C, delta M, delta Y, and delta K according to color of width-of-face deltat to be the parts which show the information C, M, Y, and K according to color of the line breadth t of a plus pattern. The line breadth amendment means 4 creates amendment data so that it may break up, it may break up using the information delta C, delta M, delta Y, and delta K according to color of width-of-face deltat and width-of-face deltat may not arise with the information C,

M, Y, and K according to color of the obtained line breadth t. As an approach of breaking up and liking width-of-face deltat as much as possible which abolishes, there is the approach of lessening the amount of toners in all the line drawing images, or lessening the amount of toners near near the edge of a line drawing image, for example.

[0017] Drawing 4 and drawing 5 are drawings explaining the example of amendment data origination at the time of adopting the approach breaks up by lessening the amount of toners, and it is made not to produce width-of-face deltat. In case image formation of the plus pattern of the manuscript image 1 for the test of drawing 2 is carried out and the image form 2 for amendment processing is created like the time of the usual image formation, the case where the toners C, M, Y, and K according to color of width of face t are used as shown in drawing 4 is assumed. The height of each color of a lengthwise direction expresses the amount of toners. Supposing it breaks up as shown in above-mentioned drawing 3 (b) as a result, and width-of-face deltat arises, the method of adjusting the amount of toners as the amendment approach, as shown in drawing 5 (a) - (d) is effective. namely, -- drawing 5 -- (-- a --) -- line breadth -- t -- the whole -- crossing -- each -- a color -- ******** -- height -- small -- carrying out -- things -- a toner -- an amount -- C -- ' -- M -- ' -- Y -- ' -- K -- ' -- decreasing -- making -- using it -- an approach -- it is . Although the momentary amount of toners of drawing 5 (b) with the same height of each color is the same, it is the example which adjusts the amount of toners by changing crosswise die-length t, respectively. It is the case where only the ends edge part of a line drawing image is the case where requirements reduction (shown all over [y1] drawing) of each amount of toners is carried out, and drawing 5 (c) makes it decrease by drawing 5 (d) changing the amount of toners of the ends edge part of a line breadth image (shown all over [y2] drawing). In addition, although the momentary amount of toners was made the same with each color as well as drawing 4 in above-mentioned explanatory view 5 (b) - (d), it is not necessary to say that each height can be adjusted and it can consider as the amount of toners of a proper value so that it may break up with the information C, M, Y, and K according to color of width of face t and may become an optimum value from delta C, delta M, delta Y, and delta K of width-of-face deltat. Thus, the copy image which it breaks up, and width-of-face deltat decreases extremely, or is not produced at all can be obtained.

[0018] Drawing 5 (a) The approach shown in - (d), or when [although not illustrated,] the reduction approach of the other amounts of toners is used, depending on the gestalt of an image, a delicate difference may arise in effectiveness. Therefore, whenever it has two or more patterns corresponding to the adjustment approach of the amount of toners like drawing 5 (a) - (d) and something chooses what has one [optimal] at the time of image formation as indicated to claim 5 of this invention for example, the image of high quality can be obtained. Moreover, whether which pattern is chosen should just choose according to the gestalt of the read manuscript image, as indicated to claim 6. That is, the pattern chosen since it has the descriptions, like that from which that from which the ends edge part of a line breadth image becomes Sharp comparatively in what consists of alphabetic characters like a text in a manuscript image is legible, and an ends edge part changes gently-sloping in a thing like a photograph looks beautiful is also made to be chosen corresponding to a manuscript image.

[0019] Drawing 6 and drawing 7 are flow chart drawings having shown the example of control of main actuation of the gestalt of this operation, and drawing 6 is the flow

chart which showed the procedure in the case of creating the amendment table of line breadth. In drawing 6 , if the manuscript image 1 for a test is set (step S1 Yes), reading will be started (S2) and the information on the line breadth t of the manuscript image 1 for a test will be memorized for the image storage means 7 (S3). Then, image formation is carried out and the image form 2 for amendment processing is created (S4). This reading will be started if the image form 2 for the above-mentioned amendment processing which carried out image formation is set next (S5 Yes) (S6). The information on the line breadth t of the manuscript image 1 for a test is read from the image storage means 7 (S7). With the extract means 3 classified by line breadth color the information -- reference -- carrying out -- the information C, M, Y, and K according to color of the plus pattern of the image form 2 for amendment processing to the line breadth t, and (S8) -- it breaks up, the information delta C, delta M, delta Y, and delta K according to color of width-of-face deltat is extracted, and it memorizes for (S9) and the image storage means 7. The line breadth amendment means 4 breaks up with the information C, M, Y, and K according to color of the obtained line breadth t, it calculates correction value so that it may break up at the time of image formation and the part of width-of-face deltat may not arise from the information delta C, delta M, delta Y, and delta K according to color of width-of-face deltat, it creates an amendment table (S10), and ends processing.

[0020] Drawing 7 is a flow chart in the case of reading the manuscript image for general, after amendment table creation processing ending by drawing 6 . In drawing 7 , when the manuscript image 1 for a test and the image form 2 for amendment processing are read, (S11, No), and warning are taken out, and it is reported that the image for general is read (S17). If Yes) and reading are started by (S11 (S12) and a line drawing image is found when the manuscript image for general is set The information C1 according to color, M1, Y1, and K1 The ** which is not outputted as it is although obtained (S13), having created -- amendment -- a table -- referring to (S14) -- image formation -- the time -- a toner -- an amount -- C -- ' -- M -- ' -- Y -- ' -- K -- ' determining (S15) -- having determined -- a toner -- an amount -- C -- ' -- M -- ' -- Y -- ' -- K -- ' It uses and an image is formed (S16). The image which breaks up and does not have width of face can be formed through such a process.

[0021] In addition, although reference is not made about the approach of lessening the amount of toners with the gestalt of the above operation, the approach can respond with the existing technique. For example, the amount of toners can be changed by adjusting light exposure in electrification to image formation, exposure, development, an imprint, and a fixation process in a color copying machine as the one approach. A manuscript image is read, a picture signal is changed into change of the quantity of light, and although led to the photo conductor charged uniformly, the coating weight of the amount of toners changes in a development phase by changing the quantity of light. The amount of toners can be easily lessened by using the approach. Moreover, in order to lessen simply the amount of toners of the edge part of a line drawing image, the approach of carrying out every other dot also has only the dot line of an edge part. In addition, there is the approach of lessening the amount of toners, and this invention is realizable even if it uses which the approach.

[The gestalt of the 2nd operation], next the gestalt of operation of the 2nd of this invention are explained. Drawing 8 is the block diagram of an equipment important section showing the gestalt of other operations of the color picture formation equipment of this invention. In this drawing, signs 21 are external devices, such as a

personal computer which the controller in an image-processing means and the whole color picture formation equipment with which a control means and 23 were equipped with ROM and, as for 24, 22 was equipped with RAM and each part of a more than [25 / 30 / an external contact and], and 26 mind an image formation means, and 20 minds the above-mentioned external connecting means 25, and is connected to color picture formation equipment. Amendment exclusion means 21a to which the above-mentioned image-processing means 21 excepts the toner of a specific color from the object of amendment beforehand, Object pixel detection means 21c which detects in what position the non-background pixel which should be counted and amended from boundary detection means 21b which detects the boundary of a background pixel and a non-background pixel, and the non-background pixel which touches the above-mentioned boundary is located, It has image storage means 21e for making the image data inputted as 21d of amendment means to amend a non-background pixel according to the detection result by this object pixel detection means 21c, from the external device 20 etc. correspond to each pixel (dot) in image formation equipment 26, and developing, and is constituted. A control means 22 controls the whole color picture formation equipment according to the program stored in ROM23, using RAM24 for a working field. The above-mentioned controller 30 is applicable also to an electrophotography type color printer and controllers, such as electrophotography type color facsimile, besides the controller of a color copying machine.

[0022] In the above configuration, the example of fundamental actuation of the gestalt of this operation and procedure is explained. Here, color picture formation equipment uses a monochromatic toner for every pixel, and explains taking the case of the case where it is equipment of the type which performs a multicolor expression with the combination of the color of two or more pixels. Hereafter, this type of color picture formation equipment is called Junji Men mold equipment.

[0023] If activation directions of image formation processing are made by the external device 20 etc., in image formation equipment 26, the above-mentioned controller 30 will carry out sequential detection of the data developed by image storage means 21e for every pixel first, and it will perform amendment processing so that toner **** may not occur.

[0024] In that case, amendment exclusion means 21a acquires the color of the pixel from the data of each pixel, and it distinguishes whether the color is a color which toner **** generates with time. This distinction processing is made by distinguishing whether the color of a pixel is a specific color specified beforehand. Moreover, if it is equipment equipped with the function which creates an amendment table like the gestalt of implementation of the above 1st, it can also distinguish whether it is the color which toner **** generates from the amendment table. And when amendment exclusion means 21a is a specific color which toner **** does not generate, it is made to shift to detection of the following pixel, without excepting from the object of amendment of the pixel, namely, amending about the pixel. And if it is judged that it is the specific color as which the color of a pixel was beforehand specified by amendment exclusion means 21a, processing shown in the flow chart of drawing 9 will be performed by making the pixel into a processing-object pixel (attention pixel).

[0025] In the flow of drawing 9 , the data (digital data) of the pixel of the perimeter 8 direction of an amendment processing-object pixel are detected first (S21). Here, as the eight above-mentioned direction is specified as shown in drawing 10 , and it is shown in drawing 11 in each direction, the data of the pixel from an attention pixel to the 4th piece shall be detected. And based on the threshold mentioned later, it judges

whether it is a background pixel or it is a non-background pixel about each pixel (S22). A judgment here is made by comparing the data of each pixel with a threshold for every color. Consequently, although the processing about the attention pixel shifts to processing of the following pixel, without carrying out if a background pixel is not detected (it is No at S22) The number P of pixels to the background pixel nearest when a background pixel is detected from Yes) and an attention pixel at (S22 That is, it investigates in what position it counts from the non-background pixel located in a boundary with a background pixel, and an attention pixel is located (S23) (refer to drawing 11 and drawing 12), and the value P determines a correction factor (t1, t2, t3) (S24). For example, as shown in drawing 13 (a), when a background pixel is in the 2nd from an attention pixel, t2 is used as a correction factor. Moreover, as shown in drawing 13 (b), when a background pixel is in the 1st from an attention pixel, t1 is used as a correction factor, and as shown in drawing 13 (c), when a background pixel is in the 3rd from an attention pixel, t3 is used as a correction factor. In this case, the degree of amendment is set up so that it may become small in order of t1, t2, and t3.

[0026] By amending using the correction factor (t1, t2, t3) determined as mentioned above, as shown in drawing 14 , the attention pixel (non-background pixel) from a background pixel to the 3rd is amended. Drawing 14 is the example which amended the amount of toners, and can prevent toner **** in the edge section effectively by amending the amount of toners of the edge (boundary) part of an image stair-like in this way. A judgment whether it is a background pixel in the above-mentioned step S22 or it is a non-background pixel is made [about a non-background pixel] on each color (Y, M, C, K) of every based on a threshold 2 about a background pixel, respectively based on a threshold 1, as shown in drawing 15 . And the value (N) of the digital data of a pixel is judged that it is size (namely, N>S1) from the value (S1) of a threshold 1, and the pixel of the method of up Norikazu is [the pixel of above-mentioned another side] a background pixel in a non-background pixel from the value (S2) of a threshold 2 at the time of smallness (namely, N<S2) for the value (N) of the digital data of the pixel of another side while adjoining each other. Therefore, only in (a), in the example of drawing 15 , the pixel of C1 is judged that the pixel of C2 is a background pixel by the non-background pixel. Moreover, it can also judge whether it is the boundary of a background pixel and a non-background pixel by comparing with threshold d difference deltaN of the value of the digital data between the pixels which adjoin each other. In that case, in the example of drawing 15 , between the pixel of C1 of (a) and the pixel of C2 and between the pixel of M1 of (b) and the pixel of M2 are judged to be a boundary.

[The gestalt of the 3rd operation], next the gestalt of operation of the 3rd of this invention are explained. With the gestalt of implementation of the above 2nd, the amendment result of an attention pixel (non-background pixel) may be less than the value of the digital data which is a background pixel depending on the combination of a threshold and a correction factor (refer to drawing 18 (b)). Then, that such nonconformity should be canceled, with the gestalt of this 3rd operation, in the image-processing means 21 of the controller 30 of the gestalt of implementation of the above 2nd, as shown in drawing 16 , 21f of pixel data permutation means is added. 21f of pixel data permutation means measures the amendment result of a non-background pixel, and a background pixel, and they perform processing which transposes the data of a non-background pixel to the data of a background pixel according to the comparison result. the flow chart which shows the content of processing [in / in drawing 17 / the gestalt of the 3rd operation] -- it is -- steps S31-S33 -- the gestalt

of implementation of the above 2nd -- steps S21-S23 of drawing 9 to kick are supported. In the flow of drawing 17 , in continuing step S34, the amendment result of a non-background pixel and a background pixel are measured, and when the amendment result of an attention pixel becomes below a background pixel, after performing background processing which transposes the digital data of a non-background pixel to the digital data of a background pixel, a correction factor is determined according to the number P of pixels from the attention pixel for which it asked at step S33 to a background pixel (S35). By having added the above-mentioned background processing (S34), as shown in drawing 18 , the digital data of an attention pixel prevents becoming smaller than the value of the digital data of a background pixel by amendment, and can prevent beforehand generating of nonconformity, like a non-background pixel becomes thinner than a background pixel.

[0027] [The gestalt of the 4th operation], next the gestalt of operation of the 4th of this invention are explained. Here, it explains taking the case of the case where color picture formation equipment is equipment of the type which the toner of two or more colors makes pile each other up for every pixel, and performs a multicolor expression. Hereafter, this type of color picture formation equipment is called pixel sequential mold equipment. The overall configuration of the color picture formation equipment of the gestalt of this 4th operation is the same as the equipment configuration of the gestalt of the 2nd operation shown in drawing 8 . However, since the color picture formation equipment of the gestalt of the 4th operation is pixel sequential mold equipment, pixel storage means 21e has two or more (it is four plane in order to perform a multicolor expression by four colors of Y, M, C, and K in this case) image data expansion fields (henceforth a plane) so that image data can be developed for every color. In the above configuration, the example of fundamental actuation of the gestalt of the 4th operation and procedure is explained. There are two kinds, the approach of synthesizing the background pixel detection result of each color (Y, M, C, K) of every, and judging whether it being a processing-object pixel, and the approach of judging from the sum of the digital data for a total color (C, M, Y, K), in the approach of decision of the pixel for amendment in the gestalt of this 4th operation.

[0028] Drawing 19 is a flow chart which shows the procedure in the gestalt of the 4th operation. In the flow of drawing 19 , the data (digital data) of the pixel of the perimeter 8 direction of an amendment processing-object pixel are first detected for every plane of each color (S41). Here, as the eight above-mentioned direction is specified as shown in drawing 10 , and it is shown in drawing 11 in each direction like the gestalt of the 2nd operation, the data of the pixel from an attention pixel to the 4th piece shall be detected. And based on the threshold set up for every color, it judges whether it is a background pixel or it is a non-background pixel about each pixel of each plane (S42). Consequently, although the processing about the attention pixel shifts to processing of the following pixel, without carrying out if a background pixel is not detected (it is No at S42) When a background pixel is detected, the number P of pixels from an attention pixel to a background pixel is counted for each [Yes) and] plane of every by (S42 (refer to drawing 11 and drawing 12), and (S43) the value P determines a correction factor (t1, t2, t3) like the case of the gestalt of the 2nd operation (S44). By amending using the correction factor (t1, t2, t3) determined as mentioned above, toner **** in an edge part can be effectively prevented like the case of the gestalt of the 2nd operation.

[0029] A judgment whether it is a background pixel in the above-mentioned step S42 or it is a non-background pixel is made [about a non-background pixel] by a total of

four planes on each color (Y, M, C, K) of every based on threshold B about a background pixel, respectively based on threshold A, as shown in drawing 20 . And while adjoining each other, when the value of the digital data of a pixel is size from the value of threshold A and the value of the digital data of the pixel of another side is smallness from the value of threshold B, the pixel of the method of up Norikazu judges that the pixel of above-mentioned another side is a background pixel by the non-background pixel. And if judged as a non-background pixel also by 1 in 4 colors color, amendment processing will be performed by making the pixel into an attention pixel. In the example of drawing 20 , although it does not accept as a non-background pixel about K (black) of (a), M (Magenta) of (c), and Y (yellow) of (d), since it is judged that C (cyanogen) of (b) is a non-background pixel, the pixel is judged to be an attention pixel.

[0030] Moreover, as shown in drawing 21 , difference deltaN of the value of the digital data between the pixels which adjoin each color (Y, M, C, K) of every is compared with threshold d. If it judges that it is the boundary of a background pixel and a non-background pixel and it is judged also by 1 in 4 colors color that it is the boundary of a background pixel and a non-background pixel when the conditions of deltaN>d are fulfilled, the method of performing amendment processing based on the result is also effective. Moreover, as shown in drawing 22 , difference deltaN of the total value of the digital data of 4 classification by color between the pixels which adjoin each other is judged to be the boundary of a background pixel and a non-background pixel, when the conditions of deltaN>d are fulfilled as compared with threshold d, and it may be made to perform amendment processing. In this case, the correction factors t of all four colors can be set up uniformly, and as shown in drawing 23 , 4 classification by color can be amended at once. As shown in drawing 24, while adjoins each other. The total value (N) of the digital data of 4 classification by color of a pixel from the value (S1) of a threshold 1 moreover, in size (namely, N>S1) And at the time of smallness (namely, N<S2), the pixel of the method of up Norikazu judges that the pixel of above-mentioned another side is a background pixel by the non-background pixel, and the value (N) of the digital data of 4 classification by color of the pixel of another side may be made to perform amendment processing from the value (S2) of a threshold 2. Also in this case, the correction factors t of all four colors can be set up uniformly, and as shown in drawing 25 , 4 classification by color can be amended at once.

[0031] [The gestalt of the 5th operation], next the gestalt of operation of the 5th of this invention are explained. With the gestalt of implementation of the above 4th, it may be less than the total value (hc+ hm+ hy+ hk) of the digital data whose amendment result of an attention pixel (non-background pixel) is a background pixel depending on the combination of a threshold and a correction factor (refer to drawing 26 (b)). Then, with the gestalt of this 5th operation, 21f of pixel data permutation means is added like the gestalt of implementation of the above 3rd in an image-processing means 21 to constitute the controller 30 of the gestalt of implementation of the above 4th that such nonconformity should be canceled. 21f of this pixel data permutation means measures the amendment result of a non-background pixel, and a background pixel, and it performs processing which transposes the digital data of a non-background pixel to the sum of the digital data of 4 classification by color of a background pixel according to that comparison result.

[0032] the flow chart which shows the content of processing [in / in drawing 27 / the gestalt of this 5th operation] -- it is -- steps S51-S53 -- the gestalt of implementation of the above 2nd -- steps S41-S43 of drawing 19 to kick are

supported. In the flow of drawing 27 , in continuing step S54, the sum (t1* c+ t1*m+ t1* y+ t1* k) of the digital data of the amendment result of a non-background pixel (attention pixel) is compared with the sum (hc+ hm+ hy+ hk) of the digital data of a background pixel, and when the former is less than the latter, it is determined that a correction factor (t4) will become the same as the sum of the digital data of a background pixel (S55). At this time, a correction factor (t4) makes all the same four colors (c, m, y, k). Thereby, the sum (t1* c+ t1* m+ t1* y+ t1* k) of the digital data of the amendment result of an attention pixel and the sum (hc+ hm+ hy+ hk) of the digital data of a background pixel become the relation as which what suited the relation expressed with a degree type (1) is expressed in a degree type (2) after the drawing 26 (c) amendment during the drawing 26 (b) amendment.
(t1* c+ t1* m+ t1* y+ t1* k)<(hc+ hm+ hy+ hk
... (formula 1)
(t4* c+ t4* m+ t4* y+ t4* k)=(hc+ hm+ hy+ hk
... </FONT> (formula 2)
By having added the above-mentioned background processing (S54), as shown in drawing 26 , the digital data of an attention pixel prevents becoming smaller than the value of the digital data of a background pixel by amendment, and can prevent beforehand generating of nonconformity, like a non-background pixel becomes thinner than a background pixel.
[0033] With the gestalten 2-5 of the [gestalt of the 6th operation] above-mentioned implementation, the correction factor of the pixel for amendment was decided with the number of pixels to the nearest background pixel. However, since toner **** may differ in the part and the thin line section of ****, when it amends by the same degree (correction factor) as the part of ****, its amendment is too strong and they may spoil the image of a thin line. So, with the gestalt of this 6th operation, amendment exclusion means 21a within the image-processing means 21 of the gestalten 2-5 of operation detects the width of face of the line expressed with a non-background pixel that the above nonconformities should be canceled, and it has the function that the width of face of a line is made not to amend to the non-background pixel of the part below a predetermined value. Furthermore, whether the non-background pixel which should give an attention pixel, i.e., amendment, is a pixel of the thin line section or 21d of amendment means within the image-processing means 21 in the gestalt of this 6th operation being the pixel of the poor section, and its attention pixel count from the non-background pixel of a boundary with a background pixel, and have the function to determine a correction factor by the pixel of what position it is.
[0034] Drawing 28 is a flow chart which shows the procedure in the gestalt of the 6th operation. In addition, here explains taking the case of the case of Junji Men mold equipment. In the flow of drawing 28 , the data (digital data) of the pixel of the perimeter 8 direction of an attention pixel are detected first (S61). And it judges whether it is a background pixel or it is a non-background pixel about each pixel (S62). consequently -- the case where a background pixel is detected although the processing about the attention pixel shifted to processing of the following pixel, without carrying out if a background pixel was not detected (it is No at S62) -- (-- several pixels to the nearest background pixel from Yes) and an attention pixel at S62 -- P is counted (S63) and line breadth Q is detected based on the result (S64). Detection of the line breadth Q here is performed about four directions, the <direction 1-5> of drawing 10 , <a direction 2-6>, <a direction 3-7>, and <a direction 4-8>. For example, the line breadth Q in <a direction 1-5> is called for from P1 pixel from the

attention pixel in a direction 1 to a background pixel, and P5 pixels from the attention pixel in a direction 5 to a background pixel. It judges whether the attention pixel is a pixel of the poor section, or it is the pixel of the thin line section from the thinnest line breadth Q in the four above-mentioned directions (S64). And in the case of the pixel of the poor section With the number P of pixels obtained at the above-mentioned step S63, a correction factor (t1, t2, t3) is determined, and, in the case of the pixel of the thin line section, a correction factor is determined from line breadth Q and the number of pixels from the attention pixel to the nearest background pixel (S65).

[0035] For example, 2 pixels, i.e., an attention pixel, count to a background pixel at the pixel of the poor section from a background pixel and the pixel which adjoins, in the case of the 2nd pixel, an attention pixel sets the correction factor of an attention pixel to t2 (refer to drawing 29 (a)), and, in the case of 1 pixel, the correction factor of an attention pixel is set to t1 to a background pixel (refer to drawing 29 (b)). Moreover, in the case of 1 pixel, an attention pixel sets the correction factor of an attention pixel to t12 to a background pixel by the pixel of a 2-pixel narrow-width line part (refer to drawing 29 (c)). In the case of 1 pixel, the correction factor of an attention pixel is set to t13 to a background pixel by the pixel of a 3-pixel narrow-width line part (refer to drawing 29 (d)). In the case of 2 pixels, the correction factor of an attention pixel is set to t23 to a background pixel by the pixel of a 3-pixel narrow-width line part (refer to drawing 29 (e)). In the case of 1 pixel, the correction factor of an attention pixel is set to t14 to a background pixel by the pixel of a 4-pixel narrow-width line part (refer to drawing 29 (f)), and, in the case of 2 pixels, the correction factor of an attention pixel is set to t24 to a background pixel by the pixel of a 4-pixel narrow-width line part (refer to drawing 29 (g)). The degree of amendment here is set up so that it may become so small that the value of the suffix of a correction factor t is large. When an attention pixel is a pixel of a 1-pixel narrow-width line part, the correction factor of an attention pixel is set to t (maximum), and it does not amend to the pixel. Thus, it judges whether an attention pixel, i.e., the non-background pixel which should be amended, is a pixel of the poor section, or it is the pixel of the thin line section. In the case of the pixel of the poor section, the attention pixel counts from the non-background pixel of a boundary with a background pixel, and a correction factor is determined as it by the pixel of what position it is. In the case of the pixel of the thin line section By the line breadth and its attention pixel of the line drawing image counting from the non-background pixel of a boundary with a background pixel, and determining a correction factor by the pixel of what position it is, and performing amendment processing with the correction factor according to each case Without spoiling an original image also to a line drawing image also to a poor image, scattering of the toner in an edge part can be lost and a natural and clear image can be formed.

[0036]

[Effect of the Invention] According to invention of claim 1, the extract means classified by line breadth color extracts the difference in the line breadth of the manuscript image for a test, and the line drawing image formed in the image form for amendment processing according to a color. Since it was made to amend so that the amendment data classified by color may be automatically computed with a line breadth amendment means based on the extracted information and the difference in line breadth may not arise at the time of general image formation The color picture formation equipment which could prevent the phenomenon of toner scattering with the same means, without being influenced by dispersion in equipment, toner scattering in

the edge edge of a line drawing image was lost certainly, lost the hue difference, and made image formation of high quality possible can be constituted. Since it had a maintenance means to hold the manuscript image for the above-mentioned test, in image equipment according to invention of claim 2, the time and effort which reads the manuscript image for a test each time can be saved, and line breadth can be amended promptly [always].

[0037] Since the test form beforehand printed as a manuscript image for the above-mentioned test was prepared in color picture formation equipment given [above-mentioned] in dyadic according to invention of claim 3, the formed image form for amendment processing and the transfer paper by which image formation was carried out with the equipment amended the color exception can see and check the amendment effectiveness by the eye easily. Moreover, if it is the storage memorized in code like ROM with built-in equipment, for example, the time and effort specially set to a manuscript base like a test form can be saved, usable can be carried out semipermanently, and there will also be no possibility of soiling or losing. According to invention of claim 4, the 1st above-mentioned term, the 2nd above-mentioned term, Or in color picture formation equipment given [above-mentioned] in 3 terms, it crosses to the whole line drawing image based on the information extracted according to the color of the extract means classified by line breadth color. Or since it had a line breadth amendment means to control the amount of toners of the edge part of a line drawing image, turbulence by toner scattering generated in the profile section of an image can be abolished, and the color picture which is in agreement with the line breadth and the hue of a subject copy can be obtained.

[0038] According to invention of claim 5, since it has two or more patterns which lessen the amount of toners of the edge parts of the whole line drawing image or a line drawing image and something can choose one at the time of image formation, the line breadth amendment means of the 4th above-mentioned term can form a beautiful image using the pattern suitable for the description of a manuscript image. According to invention of claim 6, since it can opt for selection of the pattern of the line breadth amendment means of the 5th above-mentioned term corresponding to the gestalt of a manuscript image, an image with many alphabetic characters, an image with many pictures, an image with much photograph drawing, etc. choose and carry out image formation of the pattern suitable for each description, and it is effective when the image formation equipment which can obtain an always beautiful clear image is constituted.

[0039] According to invention according to claim 7, by excepting from the object of amendment beforehand, the toner of a specific color can shorten the processing time and can prevent toner scattering very effectively by changing the degree of amendment according to physical relationship with a background image about the non-background pixel which should be amended. Moreover, reading processing of the image form for amendment processing so that in above-mentioned claim 1 by this claim 7 publication, Since it is not necessary to perform processing which extracts the line breadth of the manuscript image for a test, and the image form for amendment processing, and the toner scattering condition of the near according to a color, processing which computes the amendment data classified by color based on the information extracted according to the color Moreover, amendment processing can be carried out rather than the color picture formation equipment of claim 1 to a test in a short time, not using a form vainly. In invention of claim 8, in color picture formation equipment according to claim 7, the amendment result of a non-background pixel and a

background pixel are measured, and generating of nonconformity, like a non-background pixel becomes thinner than a background pixel can be beforehand prevented by having amended by transposing the data of a non-background pixel to the data of a background pixel according to the comparison result.
[0040] In invention according to claim 9, in color picture formation equipment according to claim 8 or 7, since the width of face of the line expressed with a non-background pixel is detected and the width of face of a line was made not to amend to the non-background pixel of the part below a predetermined value, since it amended, generating of the nonconformity of a thin line breaking off or disappearing is prevented beforehand, and the image of high quality is obtained. In invention according to claim 10, by being what uses a monochromatic toner for every pixel and performs a multicolor expression with the combination of the color of two or more pixels, it can amend independently for every toner of each color for toner scattering prevention, and color picture formation equipment according to claim 7 to 9 is simplified, and can carry out [low cost]-izing of the equipment configuration. Invention of claim 11 can be amended at once to the toner of each color, when color picture formation equipment according to claim 7 to 9 is what the toner of two or more colors makes pile each other up, and performs a multicolor expression for every pixel.

[Translation done.]